

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

PERTH

10 DEC 2003

1. ....  
2. ....  
3. ....

Applicant's or agent's file reference SJS:JN:FP18145	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/AU03/00994	International filing date (day/month/year) 6 August 2003	(Earliest) Priority Date (day/month/year) 7 August 2002
Applicant MMAGIX TECHNOLOGY LIMITED et al		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 7 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☒ Unity of invention is lacking (See Box II).

With regard to the title, ☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract, ☒ the text is approved as submitted by the applicant

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No. 2

☒ as suggested by the applicant.

☐ None of the figures

☐ because the applicant failed to suggest a figure

☐ because this figure better characterizes the invention

**Box I** Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos :  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☐ Claims Nos :  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
- ☐ Claims Nos :  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

**Box II** Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See Supplemental Boxes 1 and 2.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.  
☒ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:  
  
1-16, 101-110, 121-172, 620-671 and 1119-1170
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

- ☐ The additional search fees were accompanied by the applicant's protest.  
☒ No protest accompanied the payment of additional search fees.

**Supplemental Box 1**

(To be used when the space in any of Boxes I to VIII is not sufficient)

**Continuation of Box No: II**

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. In coming to this conclusion the International Searching Authority has found that there are different inventions as follows:

1. Claims 1,122,144,621,643,1120,1142 and any relevant dependent claim(s).  
Method, system or apparatus which involves the delegating of execution-instructions between processing resources via an instruction execution router.
2. Claim 17 and any relevant dependent claim(s).  
Apparatus comprising memory that includes an instruction unit which memory may be accessed simultaneously by processing resources wherein the processing resources and memory are on the same die.
3. Claim 36 and any relevant dependent claim(s).  
Apparatus comprising a memory cache disposed in communication with an instruction determination unit and an instruction execution unit wherein both units store values into the memory within a single cycle.
4. Claim 55 and any relevant dependent claim(s).  
Apparatus comprising an arbitration unit that includes a priority bit comparator wherein the unit is communicatively disposed with processing resources.
5. Claim 75 and any relevant dependent claim(s).  
A medium whose execution-instruction signals involve a processing resource identifier that identifies the origin of an execution signal and an operation code that identifies a target processing resource
6. Claim 85 and any relevant dependent claim(s).  
Processor with an integer processing unit, math processing unit and a router that interfaces between the units wherein the router is adapted to route the request from the integer processing unit to the math processing unit.
7. Claim 101 and any relevant dependent claim(s).  
Processor with processing units and a cache unit wherein each of the processing units is configured to sleep after sending an access request to the cache unit.
- Claim 111 and any relevant dependent claim(s).  
Processor with internal and external cache units wherein the internal and external cache units is divided into instruction and data areas and the data areas are further subdivided into local and global areas.
9. Claims 121,620,1119 and any relevant dependent claim(s).  
Method, system or apparatus that involves setting processing resources waiting on shared and locked memory being accessed by other processing resources to sleep until the memory is unlocked.
10. Claims 173,672,1171 and any relevant dependent claim(s).  
Method, system or apparatus that involves determining a priority dead-lock-avoidance value wherein the value is used to select among multiple requests with equal priority

NOTE: See continuation in Supplemental Box 2.

**Supplemental Box 2**

(To be used when the space in any of Boxes I to VIII is not sufficient)

**Continuation of Box No: II****11. Claims 211,710,1209 and any relevant dependent claim(s).**

Method, system or apparatus that involves preparing a response into a result register wherein the response includes a requesting processing resource identifier and presenting the response to all processing resources.

**12. Claims 244,743,1242 and any relevant dependent claim(s).**

Method, system or apparatus that involves waking a requesting processing resource if a requesting processing resource identifier identifies the instant processing resource and waking a processing resource if a processing resource is waiting to be unlocked.

**13. Claims 278,777,1276 and any relevant dependent claim(s).**

Method, system or apparatus that involves comparing a target memory address with register values wherein register values are used to establish a data type of the target memory address for subsequent storage in an apportioned region of cache memory.

**Claims 319,818,1317 and any relevant dependent claim(s).**

Method, system or apparatus that involves a literal constant and a literal prefix relating to a reduced size execution of execution-instructions.

**15. Claims 360,859,1358 and any relevant dependent claim(s).**

Method, system or apparatus that involves replacing odd address value in an instruction register with an even address found in a binding name table.

**16. Claims 118,395,617,894,1116,1393 and any relevant dependent claim(s).**

Method, system or apparatus that involves a status register as well as addressing a register specified by a register address or cycle flags.

**17. Claims 431,930,1429 and any relevant dependent claim(s).**

Method, system or apparatus that involves requesting that a requesting processing resource sleep until it is unlocked if a target memory is locked

**18. Claims 468,967,1466 and any relevant dependent claim(s).**

Method, system or apparatus that involves determining value types by using a hash function as well as updating value types in a primary cache memory of a processing resource to a secondary cache memory for each type value, if each value type in a primary cache has not been updated to a secondary cache memories.

**19. Claims 508,509,546,1008,1045,1507,1544 and any relevant dependent claim(s).**

Method, system or apparatus that involves an event variable and the waking of a processing resource from sleep that is waiting on an event if the event value is set not to sleep.

**20. Claims 581,1080,1579 and any relevant dependent claim(s).**

Method, system or apparatus that involves wait-on semaphore instruction, signal-on semaphore instruction and operating system trap-call.

Since the abovementioned groups of claims do not appear to share any technical features, a "technical relationship" between the inventions, as defined in PCT rule 13.2 does not exist. Accordingly the international application does not relate to one invention or to a single inventive concept, a priori.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU03/00994

**A. CLASSIFICATION OF SUBJECT MATTER**Int. Cl. <sup>7</sup>: G06F 9/50, 12/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
USPTO Web Patent Database, Esp@cenet, WPAT "multiprocessors, memory, cache, share, sleep etc."**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5522083 A (GOVE et al.) 28 May 1996 Abstract, column 36 line 25 and column 36 lines 12 to 16 for example.	1-16, 122-143, 621-642, 1120-1141
X	EP 794492 A (COMPAQ COMPUTER CORPORATION) 10 September 1997 Column 3 line 49 to column 4 line 27 for example.	144-172, 643-671, 1142-1170
X	US 5159689 A (SHIRAISHI) 27 October 1992 Entire document.	1-16



Further documents are listed in the continuation of Box C



See patent family annex

<p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"O" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>		<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>
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Date of the actual completion of the international search  
4 December 2003

Date of mailing of the international search report

17 DEC 2003

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU03/00994

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4346435 A (WISE) 24 August 1982 Entire document.	1-16
X	EP 385136 B1 (NEC CORPORATION) 21 January 1998 Entire document.	1-16
X	US 6035374 A (PANWAR et al.) 7 March 2000 Column 7 lines 1 to 3 and column 8 lines 3 to 7 for example.	101-110
A	US 5860158 A (PAI et al.) 12 January 1999 Entire document.	1-16, 101-110, 121-172 620-671, 1119-1170
A	US 5210828 A (BOLAN et al.) 11 May 1993 Entire document.	1-16, 101-110, 121-172 620-671, 1119-1170

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU03/00994

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member			
US	5522083	US	5613146		
US	5159689	EP	0158320	JP	60214041
		JP	61049238	JP	60214042
		US	5111388	US	4901225
US	6035374				
US	5860158				
US	5210828	EP	0376003	JP	2213976
US	4346435	US	4346436		
EP	0794492	US	5706514		
EP	0385136	JP	2306361	US	5499363
END OF ANNEX					